

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



BO

14.

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A23L 1/164		A1	(11) International Publication Number: WO 98/53704
			(43) International Publication Date: 3 December 1998 (03.12.98)
<p>(21) International Application Number: PCT/US98/11285</p> <p>(22) International Filing Date: 29 May 1998 (29.05.98)</p> <p>(30) Priority Data: 60/048,126 30 May 1997 (30.05.97) US</p> <p>(71) Applicant: KELLOGG COMPANY [US/US]; One Kellogg Square, Battle Creek, MI 49016 (US).</p> <p>(72) Inventors: BAILEY, John; 2 Hamblin Avenue East, Battle Creek, MI 49016 (US). FULGONI, Victor, L.; 2 Hamblin Avenue East, Battle Creek, MI 49016 (US). KINCAID, James, G.; 2 Hamblin Avenue East, Battle Creek, MI 49016 (US). SAMUEL-FERNANDO, Priscilla; 2 Hamblin Avenue East, Battle Creek, MI 49016 (US). TURPIN, Jana; 2 Hamblin Avenue East, Battle Creek, MI 49016 (US).</p> <p>(74) Agent: SCHOFIELD, Mary, Anne; Felfe & Lynch, 805 Third Avenue, New York, NY 10022 (US).</p>			
<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>			
<p>(54) Title: CREATINE CONTAINING CEREAL-BASED FOOD PRODUCT, PROCESSES FOR MAKING THESE, AND USES THEREOF</p> <p>(57) Abstract</p> <p>The invention is a creatine containing cereal-based food product. Also included as part of the invention are processes for making creatine-containing snack bars and ready-to-eat cereals. The product may be used in a dietary regime, for purposes such as increasing total body creatine. Dry mixes for making creatine containing cereal-based food products are also a feature of the invention.</p>			

**CREATINE CONTAINING CEREAL-BASED FOOD PRODUCT,
PROCESSES FOR MAKING THESE, AND USES THEREOF**

FIELD OF THE INVENTION

5 This invention relates to cereal-based food products. More particularly, it relates to food bars containing the amino acid creatine, as well as mixes useful in making the food products. The food product is preferably a snack bar or a cereal. The creatine is incorporated into the food product, so as to yield an organoleptically acceptable product. The food products may be used to assimilate creatine into the diet for any of the goals associated therewith.

10

BACKGROUND AND PRIOR ART

15 Energy for muscle contraction is derived from a hydrolysis of ATP (adenosine triphosphate). When expenditure exceeds ATP stores, muscle turns to its backup system: phosphocreatine (creatine phosphate) stores. Creatine phosphate is degraded and the phosphate is donated to ADP (adenosine diphosphate) to form ATP with the help of the enzyme creatine kinase. To date, research suggests that creatine supplementation may increase performance in situations where the availability of creatine phosphate is important, i.e., performance is improved in very high-intensity, short duration, intermittent exercise.

20 Additional research suggests that dietary supplementation induces an increase in total availability of muscle creatine, which can decrease recovery time and delay the onset of fatigue. This decrease in recovery time is especially important in repeated bouts of high-power exercise/sports, including but not limited to tennis, weight-lifting, swimming, racquetball, and rowing.

25 Creatine has been reported to be an anti-inflammatory agent that might be useful as a treatment of connective tissue inflammatory disease and arthritis (see U.S. Patent No. 4,647,453). Creatine has also been reported to be useful for the treatment of diarrhea (see U.S. Patent No. 5,516,798), for post-poning muscle fatigue (European Application No. 95 200489.3) and for treating fatigue syndrome (see U.S. Patent No. 5,312,817). While these applications and patents refer to the benefits of creatine on the body, they do not disclose incorporating creatine into a cereal-based food product.

30

U.S. Patent No. 3,624,489 discloses incorporating nitrogenous substances, one of which could be creatine, into an expanded and gelatinized cereal-based feed for ruminant animals. Unlike this invention, wherein the creatine is in a readily available form, the ruminant feed is prepared such that the creatine is not readily available. Rather, the nitrogenous substances, e.g., creatine, are unavailable to the ruminant until they are hydrolyzed by bacteria in the rumen to release ammonia, which is then converted into amino acids by those bacteria. Creatine has been incorporated previously into dietary supplements, primarily dry powders and capsules. However, those previous products do not possess the characteristics of the invention described herein.

10

DETAILED DESCRIPTION OF THE INVENTION

The invention described herein relates to incorporating creatine into cereal or grain-based food products, so that the creatine can be consumed as part of a regular meal or other aspect of a normal diet, without any connotation or association with medicines, as well as with acceptable organoleptic and shelf stable properties.

15

The food products of this invention are economical and are readily available to the consumer, e.g., they would not have to be purchased from a specialty food store. In addition, the food products of this invention are cooked rather than cold formed, have shelf-stability similar to ready-to-eat cereals and snack bars, about 6-12 months, and may also contain micro nutrients, such as vitamins and minerals, as well as macro nutrients, such as carbohydrates, proteins, and fats. The pH and moisture levels during processing of these food products are such that the creatine is readily bioavailable.

20

Creatine may be incorporated into a variety of cereal-based food products, such as, filled or unfilled snack bars, breakfast cereals, such as Corn Flakes® either frosted or unfrosted, toaster pastries, such as Pop-Tarts®, cookies, bagels, breads, muffins, cakes, beverages and toppings such as, e.g., a crumbled, granulated or powdered cereal-based composition. In another embodiment of this invention, creatine may be incorporated into a topping such as an icing, e.g., a chocolate, yogurt or fruit-based icing, which is applied to a food product. The topping may be added to a food product which itself may or may not contain creatine. Preferably, the creatine is incorporated into snack bars and breakfast cereals.

25

30

Creatine is an essential ingredient of the cereal-based food products of this invention. Generally, they contain 1-10g of creatine per serving. Preferred food products are a creatine-containing snack bar and a cereal. Preferably, the snack bars contain 3-10g creatine per serving and the cereals preferably contain 1-5g of creatine per serving. Doughs used to prepare the snack bars are formulated such that the finished product will comprise 1-10g creatine per 35g serving. Preferably, the doughs will contain from about 3g to about 10g of creatine per serving. It must be noted that a "serving" may be more or less than 35g, as the softer bars of the invention will weigh more than the crispier bars. In any event, the finished product, e.g., the snack bar or cereal, should contain anywhere from about 3% to about 30% by weight of creatine. In a preferred embodiment, the finished product contains from about 10% to about 25% by weight creatine. While percentages by weight are recited here, those of skill in the art will appreciate that the concentration of creatine may vary depending on the product and on the product serving size so that it will achieve the desired grams of creatine per serving.

Creatine is a readily available amino acid derivative. The creatine may be creatine itself, a creatine salt, creatine monohydrate, creatine phosphate or obtained from any of the raw materials known to the art as creatine. The creatine may have various physical characteristics, e.g., it may have various particle sizes or may be encapsulated.

The moisture content of the creatine containing snack bar may vary, it being especially preferred that the snack bar contain anywhere from about 2% to about 20% by weight of moisture. At moisture levels above about 20%, snack bars in general are more likely to spoil and thus the shelf life of the bars is short, about 3 weeks. However, moisture values higher than 20% may be secured when the product is made "at home," as discussed infra. The higher the moisture content, the softer and chewier the snack bar product will be. Within the preferred range of from 2-20% moisture, softer products more preferably contain from about 10% to about 20% moisture, and most preferably from about 12% to about 16% moisture. If a crispier product is desired, it preferably contains from about 2% to about 10% moisture, and most preferably from about 2% to about 5% moisture.

The snack bars will contain as additional components, a shortening, a sweetener and a grain product. "Shortening" as used herein, refers to one or more edible fats or fat substitute which is stable during baking. Included therein are vegetable shortenings, edible oils such as corn oil, cottonseed oil, rapeseed oil, palm oil, coconut oil, and so forth, liquid and solid soy oil products, oleomargarine, margarine, and so forth. The shortening may also be comprised, in whole or in part, of fat substitutes such as "OLESTRA®." The finished product may contain from about 10% to about 20% by weight of shortening.

"Sweetener" as used herein refers to one or more sweeteners and includes all natural and synthetic materials used as sweetening agents, including white sugar, cane and beet sugar, dark and light brown sugar, honey, molasses syrups such as maple syrup and sorghum syrups, fruit syrups, fruit juice concentrates, "NUTRASWEET®," "SUCRALOSE®" and so forth. The food products of this invention may have from about 10% to about 60% by weight sweetener. Those of skill in the art appreciate that the amount of sweetener in the food products may vary depending, *inter alia*, on the type of sweetener used and the desired properties of the finished product. For example, a snack bar, preferably contains from about 10% to about 20% by weight sweetener when a natural sweetener is used. The amount of sweetener may also be in the range of about 10% to about 15% by weight as well. If artificial sweeteners, such as "NUTRASWEET®" or "SUCRALOSE®" are used, the total amount by weight can, and should be reduced. The artificial sweetener can be as little as 1% by weight. "Grain product" as used herein refers to one or more grain products and encompasses any edible material obtained from any grain, including wheat, oats, corn, barley, rice, rye, millet, sorghum, amaranth seed, and so forth, and mixtures thereof. Flours, grits, bran, flaked materials, groats, meal, and so forth are also included, as are processed materials derived from grains. Exemplary of these grain products are ready-to-eat cereals such as puffed or crisped rice, cereal flakes such as Corn Flakes®, and toasted grains.

The grain product is the major component of the finished food product, and constitutes anywhere from about 20% to about 80% of the food product by weight. In a preferred embodiment, the finished snack bar contains from about 50% to about 80% of grain product, and may even contain from about 60% to about 80% by weight of grain product.

As discussed, supra, the snack bars of the invention may contain more than 20% by weight of moisture if made at home. Indeed, a further aspect of the invention is a prepared mix useful for making creatine containing snack bars at home, using standard ovens and/or microwave ovens, e.g., such mixes do not contain added moisture, or shortening, as these are added at home, but the dry mixes do contain the creatine, the sweetener, and the grain product as described supra, over the recited ranges. Of course, in the dry mixes of the invention, liquid sweeteners are not used; rather dried, powdered, or crystallized sweeteners are preferred. Where moist ingredients, such as the fruit fillings, and icings described infra are used, these are provided as a separate component of the mix. For example, a boxed dry mix may contain a separate, bagged portion of the dry ingredients, together with a can, tube, or other container of wet or moist ingredients and/or filling, topping or icing. Instructions will accompany the mixes, to facilitate preparation of a moist or crispy product.

The cereal-based food products of this invention may also contain additional optional ingredients, such as ingredients based upon fruit, nuts, flavorings, spices, and vegetables. The unfilled snack bars produced in example 2 are exemplary of snack bars, which may further comprise a fruit ingredient, e.g., in the form of a filling. Fruits which may serve as the basis for the snack bar filling include blueberry, strawberry, raspberry, apple, fig, dates, citrus fruits, dried fruits such as raisins and cranberries and so forth. These fruit ingredients may be in the form of a puree, a marmalade, a jam, a preserve, a candied peel, a dried fruit product, and so forth. An optional nut ingredient includes any type of nut, in whole, chopped, ground, grated or powdered form, as well as others not recited herein in view of their notoriety. The optional flavoring ingredients include essences and extracts such as vanilla, chocolate, almond, and all others used in the culinary arts. This is also true of optional spice ingredients. The snack bars (and other cereal-based food products) may also be frosted, coated or enrobed by materials such as chocolate, yogurt, and other standard coatings well known in the art. As those of skill in the art appreciate the snack bars and other cereal-based food products may include fortifying ingredients such as vitamins, minerals, amino acids food supplements, and so forth. These additional ingredients may be added as required for specific needs.

The cereal-based food products of this invention may also contain high fiber sources such as psyllium as set forth in U.S. patent no. 5,227,248 and in PCT/US94/10290 incorporated herein in their entirety by reference.

The process by which the snack bars are made is also a feature of the invention. In one embodiment, the creatine may be precombined with the fat, oil, and sugar before incorporation into the remaining ingredients, however, this is not required. In the one embodiment, the creatine and the fat, oil and sugar are combined in a discrete step. The remaining ingredients are combined apart from the creatine, fat, oil and sugar, and the two mixes are then combined, and baked to form a snack bar.

"Snack bar" as used herein, refers to a baked product which has substantially less sugar and has substantially more grain product than a cookie. For example, U.S. Patent No. 5,095,008 to Pflaumer et al describes conventional cookie dough as containing 20-50% by weight of sugar, and 4-25% by weight of flour, where a portion of the latter can be replaced by other products. The artisan of ordinary skill will immediately note that a dough, which by definition contains moisture, will yield a baked product containing substantially more than 20% sugar by weight if the dough contains this quantity of sugar. While the percent by weight of flour will also increase, it would not increase to, e.g., 40% by weight of the finished product.

This invention also provides for ready-to-eat (R-T-E) cereal compositions that are supplemented with creatine. Creatine is added to the R-T-E cereal compositions without adversely affecting the organoleptic characteristics, such as the color, flavor, or aroma of the cereal. The creatine may be added to the cereal during the cereal's production or the cooked R-T-E cereal may be coated with creatine or a creatine containing composition, such as a syrup or sprinkles.

In the manufacture of the products described herein, it will be understood that optional ingredients may be added at any time which is suitable for that product. A coating, for example, is of course added at the very end of the processing. Flavor ingredients and spice ingredients are best added to the sweetener/grain moisture mixture. Fruit ingredients may be added either during the mixing and baking steps, or as a coextruded ingredient, as a middle, bottom or top layer in a baked product.

The creative-containing food products of this invention are useful in any of the ways creatine has been used in the past. As indicated supra, creatine has long been implicated as a compound that is beneficial in exercise. Thus, another aspect of the invention relates to a method for enhancing performance and in some cases muscle mass, by consuming an amount 5 of the inventive snack bars, or other cereal-based food products, sufficient to provide performance enhancing and muscle building amounts of creatine to the subject. The creatine is provided in palatable, organoleptically acceptable cereal-based food product; The grain components provide energy and the creatine provides performance enhancement thus reducing recovery time. The amount of creatine necessary to accomplish this goal may vary.

10 For example, a total of about 20g of creatine per day may be consumed in a short term "loading" regimen and thereafter about 3 to 7 grams may be consumed on a daily basis. Alternatively, the loading regimen may be omitted and about 3g to about 7g may be consumed on a daily basis. The snack bars and other creatine-containing food products of this invention can be used to provide a daily dose of creatine, or they can be used in combination with other food sources of creatine, as will be recognized by the skilled artisan.

15

20 The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, it being recognized that various modifications are possible within the scope of the invention.

The following examples set forth preferred products and methods for making the cereal-based food products of the invention.

EXAMPLE 1 Unfilled Snack Bar

<u>Ingredient</u>	<u>Percent by weight</u>
Shortening	9.5
Dextrose	1.50
Rolled Oats	19.50
Granulated Sugar	11.50
Flavoring	0.60
Ice Water	7.70
Salt	0.55
Hard Wheat Flour	23.80
Cellulose	0.50
Whey	0.70
Vitamins/Minerals	0.35
Nonfat dry Milk	1.00
Potassium Bicarbonate	0.40
Corn Syrup	11.35
Creatine	11.10

20 The creatine was blended with shortening and sugar, and then mixed at high speed in a kitchen aid bench-top model mixer for 5 minutes.

All remaining ingredients, except oats were added to the mixture and mixed for an additional 3 minutes at high speed.

The oats were added, and mixed for 1 minute at high speed.

25 The mix was then formed into bar-shape of approximately 1.5 x 4 inches.

The bars were then baked at 365°F for 9 minutes.

EXAMPLE 2 **Fruit Filled Snack Bar**

<u>Ingredient</u>	<u>Percent by weight</u>
Shortening	9.5
Dextrose	1.50
Rolled Oats	19.50
Granulated Sugar	11.50
Flavoring	0.60
Ice Water	7.70
Salt	0.55
Hard Wheat Flour	23.80
Cellulose	0.50
Whey	0.70
Vitamins/Minerals	0.35
Nonfat dry Milk	1.00
Potassium Bicarbonate	0.40
Corn Syrup	11.35
Creatine	11.10
Fruit Filling	

5

10

15

20

The snack bars were prepared as in Example 1 except, the bars were filled with the fruit filling prior to baking at 365°F for 9 minutes.

EXAMPLE 3 **Protein - Enriched Cereal Bar**

<u>Ingredient</u>	<u>Percent by weight</u>
Shortening	9.5
Dextrose	1.50
Rolled Oats	5.0
Granulated Sugar	11.50
Flavoring	0.60
Ice Water	7.70
Salt	0.55
Hard Wheat Flour	23.80
Cellulose	0.50
Whey	0.70
Vitamins/Minerals	0.35
Nonfat dry Milk	1.00
Potassium Bicarbonate	0.40
Corn Syrup	9.00
Creatine	11.10
Soy Protein Concentrate	14.5

The creatine was blended with shortening and sugar, and then mixed at high speed in a kitchen aid bench-top model mixer for 5 minutes.

All remaining ingredients, except oats were added to the mixture and mixed for an additional 3 minutes at high speed.

The oats were added, and mixed for 1 minute at high speed.

The mix was then formed into bar-shape of approximately 1.5 x 4 inches.

The bars were then baked at 365°F for 9 minutes.

EXAMPLE 4 **Cereal Bar**

<u>Ingredients</u>	<u>Weight (gms)</u>
Crisped Rice	308.8 gms
Marshmallows	518.95 gms
Margarine	104.95 gms
Creatine	100 gms
Vegetable cooking spray	

- 10 Margarine was melted in large saucepan over low heat.
Marshmallows were added and stirred until completely melted.
The marshmallow and margarine mixture was removed from heat.
Crisped rice cereal was mixed into the mixture and stirred until well coated.
Creatine was then added and mixed in uniformly.
- 15 The creatine-containing mixture was spread evenly into a 13x9x2 inch pan coated
with cooking spray, and then cut into 2x2 squares.

EXAMPLE 5 **Multigrain Cereal Bar**

<u>Ingredients</u>	<u>Weight (gms)</u>
Multigrain cereal	308.8 gms
Marshmallows	518.95 gms
Margarine	104.95 gms
Creatine	100 gms
Vegetable cooking spray	

5

Margarine is melted in large saucepan over low heat.

Marshmallows is added and stirred until completely melted.

The marshmallow and margarine mixture is removed from heat.

Multigrain cereal is mixed into the mixture and stirred until well coated.

Creatine is then added and mixed in uniformly.

10

The creatine-containing mixture is spread evenly into a 13x9x2 inch pan coated with cooking spray, and then cut into squares.

15

EXAMPLE 6 Coated Corn Flakes®

<u>Ingredients</u>	<u>Weight (lb.)</u>
Water	7.2
Corn Flakes®	16.3
Sucrose	10.9
Creatine	4.5
Flavoring	0.21 g

10

Sucrose and water are combined, and heated in a continuous flow heater to 270°F to concentrate the syrup/water combination to approximately 85 Brix forming a superheated syrup.

15

Corn Flakes® are placed in a coating drum, the dry creatine is added to the Corn Flakes® and simultaneously the superheated syrup is sprayed onto the flakes, while tumbling to coat the flakes.

The coated flakes are dried at 100°F for 5 minutes and cooled to room temperature.

EXAMPLE 7 **Protein Enriched Cereal**

	<u>Ingredients</u>	<u>Weight (lb.)</u>
5	Water	20.7
	Precooked Rice	69.1
	Creatine	15.5
	Wheat Germ Flour	5.8
	Sucrose	3.88
10	Whey Solids	0.57
	Calcium Caseinate	0.24
	Soy Protein Concentrate	7.64
	Wheat Gluten Flour	4.11

15 The rice was cooked with sugar in a rotary cooker under 15-25 lbs. steam pressure for a period of between one to two hours, or until uniformly cooked throughout.

The cooked rice was then dried to approximately 13% moisture content.

20 The cooked and dried rice was sprayed with water at a temperature of 110-180°F to moisten to about 20-24%. The remaining ingredients were combined and as the rice was mixed slowly in a Hobart mixer, the remaining ingredients were added to coat the rice.

25 The coated rice was tempered for a few minutes and then promptly fed between rolls and bumped to a medium flake. The flakes were then dried at about 165°F to a moisture content of 10-15%, tempered 25 minutes, and then baked at about 390-450°F for 15-30 seconds to a slightly puffed, light golden condition. After discharge, the flakes were subjected to a vitamin solution spray.

EXAMPLE 8 Topping

	<u>Ingredients</u>	<u>Weight (lb.)</u>
5	Water	4.0
	Powdered sugar	9.4
	Creatine	2.8
	Sorbitol	0.16
	Gelatin	0.08

10

A syrup is prepared by mixing the water, gelatin, powdered sugar, and sorbitol at room temperature. The syrup is heated in a double boiler to 170°F. One third of the syrup is sprayed on top of a grain-based food product using a low air pressure spray gun.

15

Creatine is then added on top of the partially sprayed grain-based food product by continually spraying the syrup while simultaneously coating with creatine.

The creatine containing-coated product is then dried in room temperature air for 30 minutes.

20

Depending on the type of grain-based product the concentration of creatine in the topping may vary so that it will be higher or lower than the concentration recited here to achieve the desired grams of creatine per serving of grain-based products.

EXAMPLE 9 Creatine-Containing Clusters

<u>Ingredients</u>	<u>Percent by weight</u>
Crisped rice	37.40%
Barley flakes, crushed	13.91%
syrup:	34.78%

	<u>Percent by weight</u>
water	10.71%
sugar, granulated; white	35.71%
corn syrup, 42DE	<u>53.58%</u>

15 Total 100.00%

20 creatine powder 13.91%

25 Total 100.00%

The syrup ingredients (water, sugar, corn syrup) were placed in a small pan (total weight 1120 g) and heated on a gas range to 250°F. During heating the sides of the pan were washed down to recover sugar crystals that may have attached to the sides and to increase the solids content of the syrup. 500 g of the hot syrup mixture were stirred by hand with 200 g of the creatine powder. Other dry powders could also be mixed into the syrup. 200 g of barley flakes were added to the creatine-syrup mixture and mixed further by hand stirring. The creatine-syrup-barley mixture was kept under an infrared heat lamp. Small bits were torn from the mixture and dropped into a bowl containing crisped rice. The bits of creatine-syrup-barley mixture and crisped rice were left in the bowl for about 20 minutes under infrared heat lamp to soften and adhere more crisped rice to bits. After 20 minutes, the crisped rice coated bits were sorted to remove crisped rice which have not adhered to the creatine-syrup-barley bits. The sorted bits were dried without heat in a vacuum oven for 1 hour at 30 in Hg. The dried bits were sealed in plastic bags.

30 A 30 g serving of clusters provides 4 g creatine.

EXAMPLE 10**Bagels with Creatine****Ingredients**

Unbleached All-purpose Flour	5½ cups
Water (110°F)	2 cups
Yeast	1 tablespoon
Salt	1 tablespoon
Sugar	3 tablespoons
Creatine	80 gms

5

10

15

20

The sugar, yeast, water and one cup of flour are combined in a large mixing bowl and mixed thoroughly. The mixture is allowed to stand for 10 min. Salt is stirred into the mixture. Four cups of flour are added slowly with stirring to form a dough. The creatine and remaining ½ cup of flour is added to the dough while kneading and folding for about 3 minutes. The dough is formed into a ball and placed in a greased bowl. The dough is covered and allowed to raise for 2 hours at about 85°F. The risen dough is punched down, divided into about 16 equal portions and each portion is rolled into a strip about 7 inches long and about ½ inch thick. Each strip is formed into a bagel shape by pinching the ends together.

The bagel-shaped dough is allowed to raise for 25 minutes at about 85°F and then the risen bagel-shaped dough is cooked in boiling water for about 3-4 minutes. The boiled dough is then baked for 10 minutes at about 450°F. The baked bagels are cooled. The baked bagels contain about 5 grams of creatine per bagel.

We Claim:

1. A creatine containing snack bar which comprises, per snack bar:
about 10% to about 30% by weight creatine;
5 about 1% to about 20% by weight shortening;
about 5% to about 60% by weight sweetener;
about 20% to about 80% by weight grain product, and;
about 2% to about 20% by weight moisture.
- 10 2. The snack bar of claim 1, comprising from about 10% to about 25% by weight creatine.
- 15 3. The snack bar of claim 1, comprising from about 10% to about 15% by weight sweetener.
4. The snack bar of claim 1, comprising from about 50% to about 80% by weight grain product.
- 20 5. The snack bar of claim 1, comprising from about 60% to about 80% by weight grain product.
6. The snack bar of claim 1, comprising from about 2% to about 10% by weight moisture.
- 25 7. The snack bar of claim 6, comprising from about 2% to about 5% by weight moisture.
8. The snack bar of claim 1, comprising from about 10% to about 20% moisture.
9. The snack bar of claim 8, comprising from about 12% to about 15% moisture.

10. The snack bar of claim 1, further comprising at least one additional ingredient selected from the group consisting of a fruit, a nut, a flavor, a spice, and a vegetable.
11. The snack bar of claim 1, wherein said grain product is a wheat-based product.
5
12. The snack bar of claim 1, wherein said grain product is an oat-based product.
13. The snack bar of claim 1, wherein said grain product is a corn-based product.
10
14. The snack bar of claim 1, wherein said grain product is a rice-based product.
15. The snack bar of claim 1, wherein said grain product is selected from the group consisting of wheat, oats, corn, barley, rice, rye, millet, sorghum, amaranth seed and mixtures thereof.
15
16. The snack bar of claim 1, wherein said grain product comprises rolled oats and wheat flour.
17. The snack bar of claim 1, prepared by:
20
 - (a) blending said shortening and said creatine to form a first mixture;
 - (b) combining said sweetener and said grain product with an amount of water sufficient to form a moistened, second mixture;
 - (c) combining said first and second mixture to form an uncooked snack bar product, and
 - (d) baking said uncooked snack bar product.
25
18. Process for preparing a creatine containing snack bar, comprising:
30
 - (i) mixing creatine, shortening, and sugar to form a first mixture,
 - (ii) mixing a sweetener and a grain product with water to form a moistened second mixture,
 - (iii) combining said first and second mixture to form a third mixture, and

(iv) baking said third mixture to form a snack bar,

wherein said third mixture comprises, on a weight percent basis:

- (i) about 10% to 30% creatine;
- (ii) about 1% to 20% shortening;
- (iii) about 5% to about 60% sweetener;
- (iv) from about 20% to about 80% grain product, and
- (v) from about 2% to about 20% water.

19. Process for preparing a creatine containing snack bar, comprising:

- (i) mixing a sweetener, a grain product and water to form a first mixture,
- (ii) adding a shortening to said first mixture to form a second mixture,
- (iii) adding creatine to said second mixture to form a third mixture, said creatine being added in an amount sufficient to produce a third mixture containing from about 10% to about 30% by weight creatine, and
- (iv) baking said third mixture to form a snack bar.

20. Dry mix useful for preparing a creatine containing snack bar, comprising:

- (i) from about 10% to about 30% by weight creatine;
- (ii) up to about 20% by weight of a dry sweetener; and
- (iii) from about 40% to about 80% by weight of a grain product.

21. A creatine-containing ready-to-eat (R-T-E) cereal comprising:

- (i) about 3% to about 30% creatine;
- (ii) about 20% to about 80% grain product;
- (iii) about 5% to about 60% sweetener; and
- (iv) about 2% to about 12% moisture.

22. The R-T-E cereal of claim 21, wherein the R-T-E cereal is coated with a composition comprising a sweetener.

23. The R-T-E cereal of claim 21, wherein the creatine amount is about 10% to about 25%.

5 24. The R-T-E cereal of claim 21, wherein the grain product is selected from the group consisting of wheat, oats, corn, barley, rice, rye, millet, sorghum, amaranth seed and mixtures thereof.

10 25. The R-T-E cereal of claim 21, wherein the grain product is selected from the group consisting of rice, corn, barley, wheat, rye, and oats.

26. The R-T-E cereal of claim 21, wherein the grain product comprises rolled oats and wheat flour.

15 27. A grain-based food product organoleptically suitable for human consumption comprising at least one cooked grain product and creatine in an amount sufficient to enhance exercise performance.

20 28. A grain-based food product organoleptically suitable for human consumption comprising at least one cooked grain product and creatine in an amount sufficient to enhance muscle mass.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/11285

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) A23L 1/164

US CL : 426/618

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 426/618, 94, 549, 619, 620

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
none

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, DIALOG

search terms: creatine, cereal, food

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,275,830 A (SMITH) 04 January 1994 (04-01-94), columns 9-10.	1-28
Y	US 5,223,298 A (WULLSCHLEGER et al.) 29 June 1993 (29-06-93), see abstract.	1-28
Y	US 5,534,275 A (HUMBERT et al.) 09 July 1996 (09-07-96), see abstract.	1-28
Y	US 5,270,063 A (WULLSCHLEGER et al.) 14 December 1993 (14-12-93), see abstract.	1-28
Y	DE 19526236 A1 (WEISS et al.) 18 July 1995 z918-07-95), see abstract.	1-28

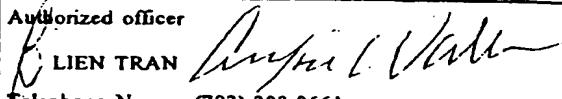
Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)	"Z"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
---	--

14 AUGUST 1998

02 SEP 1998

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer  LIEN TRAN Telephone No. (703) 308-0661
---	---

THIS PAGE BLANK (USPTO)